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## **CHINA - AIR TRAFFIC CONTROL (ATC) EQUIPMENT**

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### **A. OVERVIEW**

This report covers Air Traffic Control (ATC) and related equipment, which includes: radars, meteorology equipment, communication, navigation and landing aids, instrument landing systems, terminal area and control center equipment and information systems satellites.

In China's rapidly expanding market, the aviation sector stands to be one of the most promising for US exports. Since 1990 China's annual air passenger volume has grown at an average rate of 30%, reaching 28.7 million passengers in 1992. Economic reform, burgeoning tourism and the drag of poor ground transportation on economic growth have led to the rapid expansion of the civil aviation sector. In order to meet this new demand, airports are being constructed and renovated.

During the last fifteen years air traffic control procurement in China has taken a back seat to fleet expansion. This has led to the relatively backward state of air traffic control in China. Furthermore, the purchasing of modern equipment and technical training has been hindered by a lack of coordination, priority and funding. These factors have contributed to the substandard safety reputation of China's airlines.

In order to remedy this situation, and to demonstrate to the world its commitment to safety and modernization, China has committed itself to the upgrading of its civil navigation system. China's State Council has slated

several hundred million of dollars in the coming years for improving and expanding its civil navigation system. The Chinese government plans to invest over one billion RMB (USD 200 million) alone in upgrading its ATC systems during the current Eighth Five-Year Plan (1991-1995). During this period ten new airports in southern and central China have been planned. Nation-wide, over the next ten years, 40 major airports and 40 minor airports are slated to be built anew or modernized. Many of these will require ATC equipment. In addition to central and local government funding, capital will come from several external sources, notably Japan's Overseas Economic Cooperation Fund (OECF). China welcomes foreign investment to help finance its many infrastructure projects including airports.

The Chinese market for ATC and related equipment is projected to expand by 30% annually for the next several years. This estimate is based on production and sales figures provided from major international ATC suppliers, as well as import statistics.

China does not supply its airports with domestic equipment; purchases of most sophisticated equipment come primarily from overseas. Thus, this market is extremely import friendly. If American companies can offer competitive prices, they will be well positioned to capture a substantial share of China's growing market.

## B. STATISTICAL DATA

Note : This report is based on Chinese statistics. The figures are in millions of US dollars:

\*1. These statistics were compiled from 1991-93 Chinese customs statistics.

\*2. These exports figures were unavailable perhaps due to the negligible quantity.

EST. %CHG	1990	1991	1992	1993-95 EST
1. Import Market	30	42	54	35-40%
2. Local Production	N.A	N.A	N.A	N.A
3. Exports	N.A	N.A	N.A	N.A
4. Total Market	30	42	54	35%-40%
5. Imports from the U.S	10	12	15	25%
6. Exchange Rates official 8.4 RMB/ 1 USD				
7. Exchange Rates				

spot 8.9 RMB/ 1 USD

8. Future Inflation Rate Assumed 15%

9. Last year's Import Market Share (percentage for USA and Major competitors).  
USA 25% FRANCE 50% ITALY 30% GERMANY 50%

10. Receptivity Score 4

This receptivity score is based on the opinions of equipment suppliers and end users. The United States scores high on this scale because American companies are recognized as key leaders in the aviation industry.

#### US EXPORTS TO CHINA (in thousands of dollars)

	<u>1990</u>	<u>1991</u>	<u>1992</u>
1. Radio Navigation aids	8069	8415	10071
2. Electrical instr aeronautical or space navigation	4422	8654	5470
3. Radio transmitters (for civil aircraft)	28	9	125
4. Radio transceivers (for civil aircraft)	2692	2888	5306
5. Communications satellites	39049	NA	77764
6. Radar, radio navigation aid antennas	18	366	182

#### C. MARKET ASSESSMENT

The Chinese airline industry is growing rapidly. Local demand has increased yearly and both cargo and passenger traffic is estimated to be increasing at more than 25% per annum. The airlines have been expanding their fleets at an equally rapid rate. During the Seventh Five Year plan (1986-1990), the civil aviation infrastructure developed quickly with 25 airports either constructed or upgraded. However, most of these were small scale projects and foreign funding was only required for two of them, Xiamen airport in Fujian province and Jinan airport in

Shandong province. China currently has 58 International routes and roughly 400 domestic routes. The Chinese ATC system comprises nine flight information regions. There are at present over 125 airports.

Pushing forward under the eighth five-year plan, the current ATC modernization drive is proceeding toward the achievement of a fully integrated national route structure, consisting of individual domestic and international routes. In terms of equipment, this implies supplying the appropriate ATC and ground and satellite installations along these routes in order to make them operational. The current ATC modernization drive is proceeding toward the achievement of four specific goals. These include:

1. The establishment of new international air routes, including routes between southern Chinese cities (Guangzhou and Kunming) and Hong Kong; between China and Europe; and, eventually, between Asia and Europe, linking Hong Kong with Europe via southern China and Urumqi in Xinjiang Province.
2. The modernization of the Chinese east coast route structure, which links Shenyang, Beijing, Xian, Chengdu and Kunming. The open door economic policy has made it necessary to accelerate the development of the east coast route structure; the development of western routes will be delayed for now.
3. The supply of appropriate ground and satellite equipment and installations along these routes.
4. The integration of the individual domestic and international routes such that the end result is a fully integrated national route structure. The Chinese government intends to install Radars VOR's and DME's, ILS's a satellite receiving network, automated ATC Radar and meteorological data processing systems. Japan is financing a substantial portion of these purchases through the OECF which total about 1.2 billion RMB per year. The OECF is implementing a phased financing plan for ATC modernization, designed to coincide with China's five year plans. To date China has used OECF loans to purchase radar systems, and instrument landing systems, weather radars, satellite ground stations and other equipment for over 50 airports. Financing is also coming from other foreign governments, from the Civil Aviation Administration of China (CAAC) and Chinese provincial and municipal governments.

In the movement toward advanced technology, two additional areas will be emphasized in future planning. The first of these is Mode S technology. CAAC has asked in recent tenders financed by Japan's OECF that equipment offered by foreign vendors have the capability for upgrade to S Mode technology. Although CAAC intends to do so, the timing of any actual transition to Mode S has not been decided upon. The second movement will be toward the gradual introduction of satellite, radar and communications systems. Current experiments are designed only to cover gaps in current ground based radar tracking. CAAC is considering a gradual, more extensive introduction of satellite systems in the future.

From CAAC's perspective, satellite systems offer two advantages. First, the technology is advanced and very reliable. Second, the transition to satellite systems will be fairly easy in China because, given the present rudimentary ATC system, there will be no need to abandon an extensive existing ground based system.

Any such system must meet international civil aviation organization (ICAO) standards. China is therefore interested in international cooperation. CAAC is currently working with Japan's Civil Aviation Bureau to produce studies on future navigation systems, for example. According to CAAC, Japanese Yen loan allocations, either between now and 1995 or during the Ninth Five-Year Plan period (1995-2000), will be used to finance the purchase of 100 satellite ground stations in order to improve the country's satellite navigation capability. This will not be enough to cover the whole of Chinese airspace, but is viewed as an important first step.

#### **CURRENT AIRPORT PROJECTS:**

Over 40 major new airport or airport renovation projects are planned for the next five to ten years. CAAC officials have said that there will be about 40 smaller projects undertaken at the provincial level as well, two or three per province. Companies interested in provincial projects should contact the local governments concerned. As a general rule, capital cities and cities in popular tourist or business locations will be likely targets for new or renovated airports. Below is a partial list of the large-scale projects:

There are currently five large-scale, high-priority projects in process:

- Beijing Airport: A new terminal building is to be built, in part, with OECF support.
- Guilin Airport: Construction of a new runway to accommodate Boeing 747 aircraft. Guilin reportedly has its own foreign exchange for imports.
- Fuzhou Airport: Construction of a new runway for 747's. The city is seeking investment to finance the project.
- Urumqi Airport: Construction of a new runway for 747's. This point is to be a key link in the proposed plan to establish an air route from southern China through Russia to Europe.
- Chengdu Airport: A renovation project to include a new runway and terminal building.

The feasibility studies for seven more large projects have been approved. They are all now in the preliminary design phase:

- Nanjing Airport: Construction of a new airport to handle 747's. Discussions are reportedly under way with the Dutch Government which may lead to the provision of a soft loan.

- Zhengzhou Airport: A renovation project of unspecified parameters.
- Harbin Airport: Construction of a new airport, possibly with a loan from the South Korean Government
- Yinchuan (Ningxia Autonomous Region) Construction of a facility to handle MD-82 aircraft
- Dunhuang Airport (Gansu Province) Construction of a new airport to handle MD-82's.
- Sanya Airport (Hainan): A new airport, possibly to be financed with a French Government loan.
- Guangzhou Airport: Two plans are under consideration. First, to renovate the existing airport with a new runway. Second, to build an entirely new airport
- Haikou Airport (Hainan): Construction of a new airport
- Hangzhou Airport: Construction of a new airport.

Other important projects either underway or soon to be undertaken are:

- East China Air Group, an investment group formed by six regional governments (covering Shandong, Jiangsu, Zhejiang, Anhui, Jiangxi, and Fujian provinces) and China Eastern, one of the largest airlines, plans to invest 10 billion RMB (USD 1.8m) to expand civil aviation facilities. Twenty new airports are planned by the year 2000
- Shanghai's Hongqiao airport is scheduled for a major expansion beginning in 1994, to be completed in 2005. ATC equipment will be needed. (The expansion includes a second runway and a new terminal area)
- New airports will be built at Zhoushan and Quzhou, in Zhejiang Province.
- Wuzhou Airport will build a medium sized feeder airport. Telecommunications and Nav aids will be bought through China Southern Airlines's purchasing department.
- The construction of Liuzhou airport will require new telecommunications, meteorological, and Nav aids equipment.
- Gaoqi International airport (Xiamen special economic zone) is currently undergoing an expansion. (The expansion includes a new taxiway, terminal building, and oil depot).
- Hainan Province is going to build Sanya Fenghuang Airport (Sanya City)

-- Yixu in Fuzhou will house the country's first instrument guidance system - USD 2.9 mill. of German equipment has already been installed

-- Wuhan Tianhe International Airport will be receiving an OECF loan worth 7 850 billion yen (USD 47.3m)

Companies should follow plans to build or renovate airports in the following cities: Shenzhen, Xiamen, Dalian, Shantou, Wenzhou, Ningbo, Yantai, Qingdao, Chongqing, Dayong, Zhuhai, Yichang, Yanji, Beihai, and Guiyang.

#### **D. END USER PROFILE**

In the past, CAAC played a central role in equipment and technology procurement. However, the procurement system for China's aviation sector is now in a state of flux due to continuing decentralization. CAAC still dominates CAAC controlled tenders and CAAC airports. In municipalities, however, their influence in purchasing decisions, while always important, is not always decisive. Procurement decisions are made in complex negotiations between the donor country, if foreign financing is involved, the management of the end-user airport, the purchasing agent or bid manager and, of course, CAAC. Financing can be raised centrally, or locally through foreign loans, taxes and bonds, or from investment groups. The procurement decisions generally must gain the approval of the municipalities, State Planning Commission, CAAC, Ministry of Foreign Trade and Economic Cooperation and sometimes even the state council. China Air Supplies Corporation, and CAAC can serve as purchasing agents.

CAAC was established in 1949. At that time CAAC controlled all aspects of aviation from licenses to purchases. CAAC was the only end user and was responsible for all aspects of state airlines and airports. Under recent reforms, CAAC has become more of a regulatory body, overseeing airlines and airport managers, along the lines of the FAA in the United States. CAAC is still responsible for the safety of all China's airline and air traffic control systems, as well as the airworthiness of China's aircraft.

CAAC and the FAA are continuing to strengthen their already-close ties. CAAC has relied heavily in recent years on the advice and experience of the FAA. In 1986 the FAA and CAAC concluded a memorandum of understanding for technical cooperation in the field of civil aviation. In 1991 the FAA was invited to conduct an evaluation of China's air traffic control system. The local CAAC directors of Beijing, Shanghai and Guangzhou all have had exchanges with the FAA resulting in recommendations for ATC training, organization and equipment. The relationship between the FAA and CAAC will affect the policies and development of China's aviation industry for a long time to come. It is hoped that CAAC's procurement pattern will become more sophisticated, and that higher priority will be given to quality and long-term cost savings. Such a procurement agenda would benefit American companies.



Airports now fall into three models of 'management' those controlled by municipalities, those owned by airlines, and small military airports that double as civilian feeders. All three types are keen to expand and modernize, as larger and better run airports translate into more prestige and business activity.

Sales channels have undergone a significant transformation with the recent devolution of economic power from the center to local governments. In general, the locus of decision-making is now determined more by the financing arrangements than by bureaucratic imperatives.

Following are examples of several possible scenarios

1. The State Council allots CAAC a certain amount of money for equipment acquisition. CAAC budgets this money to projects according to nationally set priorities, for example the Capital airport in Beijing. CAAC will have almost complete power over CAAC-controlled tenders, such as the recent OECF projects. Another situation in which CAAC carries a lot of influence is when a foreign government grants a loan to the Central government or a local government. The power of the center increases whenever foreign government loans are involved.
2. If municipalities or provincial governments find their CAAC allocations insufficient, they have several other financing sources. They can request the State Planning Commission to allocate additional funds. CAAC would then become more of an advisor to municipalities in cases in which funding is provided directly from the central government to the local government. This gives the municipalities considerable power and, very often leads to fierce competition between province and city governments for central governmental loans.
3. If the municipalities raise funds on their own, they will be the primary manager of the procurement. Municipalities can raise their own funds through taxes, or by forming local investment groups as in the case of Shanghai. Many cities now have their own foreign exchange reserves or can buy hard currency with domestic currency. Although CAAC has to approve the technical aspects of any sale, its influence over decisions regarding foreign vendors is greatly reduced in cases where local government is paying the bills. This is particularly so when projects are being financed with local funds and foreign export credits rather than foreign government soft loans. However, because municipalities lack import-export authority, procurement must be managed by a trading company, which acts on their behalf.

The process by which CAAC makes technical and commercial decisions is not entirely transparent. Purchasing recommendations are submitted by engineers in CAAC's various technical departments, and both technical and budgetary factors are considered throughout the process.

## E. BEST SALES PROSPECTS

1. Primary Radar Systems
2. C-band weather Radars
3. Wind Shear Radars
4. Weather Radars
5. Inspection Aircraft
6. Test planes
7. Meteorological instruments and equipment
8. Automatic meteorological Chart plotting equipment
9. Automatic weather observation systems
10. Data terminal equipment
11. Communications systems
12. Volmet broadcasting systems
13. Multi -Channel VHF TX/RX systems
14. Satellite communication systems
15. Satellite Radio Fax Broadcast Systems

(The above items were subjects of the 1993 OECF ATC tender. Companies should monitor press reports and official announcements regarding future tenders)

## **F. COMPETITIVE SITUATION**

### *1. DOMESTIC PRODUCTION*

China Electronics Import & Export Corporation, one of China's few air equipment manufacturers, consistently bids lowest or second-to-lowest in international tender offers. They market their own products, Chinatron's products, as well as those of subcontractors. So far they have had limited success with OECF tenders for several reasons. First, while supplying some ATC equipment, they have little experience in and limited capabilities for putting up entire

systems. Second, the Chinese government lacks confidence in Chinese technology when compared to that offered by international leaders. Third, when receiving OECF loans they have no special advantages, unlike World Bank loans where they receive a 15% price preference.

In order to develop their industrial capabilities, Chinese companies have sought foreign joint ventures, but with limited success. Chinatron, an electronics manufacturer involved in the production of all types of electronics, is one such company that is very interested in finding an American partner. The head of the company believes that a joint venture with an American company will reduce the costs of production for the American company, especially in the long run. A joint venture project will also receive the approval of the central government, which, it is hoped, will result in more contracts. According to Chinatron, American companies are favored because they are perceived to have superior technology.

## 2. IMPORTS

Imports represent a large portion of this subsector. Domestic production is an adequate source for some basic equipment, but air traffic control systems are more complex and require very sophisticated equipment, most of which is acquired from foreign companies.

## 3. AMERICAN MARKET SHARE

Only a few American companies have been active in China's ATC market over the past decade. Generally high prices through the 1980s and American export controls which have kept some high-tech firms from making sales have combined to keep America's market share small. An additional difficulty that US companies face is China's inadequate infrastructure, which lacks the ability to fully absorb the higher technological level of US products. Nevertheless, US firms have maintained a 20-25% share of the Chinese market, and because of recent defense cutbacks in the US and the strength of the Chinese economy, many more American companies are seriously attempting to enter China's market. A barometer of this trend is the level of American participation in the recent OECF tenders. One U.S. company tendered a bid in the 1992 procurement round; eleven are involved in the competition for the 1993 round.

In general, US companies have a competitive advantage in quality, but suffer because of their higher prices. In one case, a US company's equipment was judged to be too expensive and too technically advanced for the targeted airport, and thus it was not considered for purchase. According to CAAC, the situation at this airport did not warrant the more expensive technology the US company offered. The Chinese have traditionally compromised on technology in favor of low prices. Accordingly, much of the equipment purchased has been in the middle to low end of the price spectrum.

Several US companies have adopted a productive strategy which targets projects that require hi-tech equipment when compromises cannot be made. Many of the southern airports, especially in the special economic zones (SEZ's), are tremendously busy. Because of their heavy traffic,

these airports require extremely sophisticated and reliable equipment, thus making them ideal markets for American ATC companies

#### *4. PROMINENT SUPPLIERS and COMPETITION*

The major non-American companies active in this market are Alenia, T-CSF, Siemens, Marconi, Toshiba, Alcatel, NEC, Marubeni and Plessey/Siemans.

Alenia entered the Chinese market in the mid 1970's, but did not secure any major contracts until 1989. Alenia, an Italian company, has a distinct advantage because expensive post-sale repairs and parts could possibly put them in disfavor with CAAC.

T-CSF sold 5 TSR systems to CAAC in the 1980s, but it has not achieved much enduring success.

Information on the activities of other foreign companies is unavailable.

#### *5. COMPETITIVE FACTORS*

CAAC planners and local airports use four criteria to evaluate equipment for possible acquisition:

##### *a. PRICE*

China is only just beginning ATC modernization so considerable demand exists for equipment and technology. CAAC has been given approval to acquire as much equipment and technology as possible, but funds are limited. The financial constraints result in purchases of technologically-inferior equipment which CAAC believes is adequate for China's situation. However, CAAC is beginning to consider more carefully the full life-cycle costs of equipment against offer prices received in response to tenders. These calculations are based more on the actual experience of Chinese end users than any mathematical or technical evaluation. Nevertheless, price is still the most important factor.

##### *b. SUITABLE TECHNOLOGY:*

Technology must be suitable for China's conditions. Some less advanced equipment may be suitable for certain areas of China. Questions concerning the capability of ATC personnel to absorb high technology training arise as well. Regional differences play a role in the technology equation. The eastern parts of China are well-endowed with universities and college graduates with English skills are relatively available. The western parts of China are handicapped in the sense that higher education is simply less available. Equipment that may be appropriate in the East may not be in the West. Equipment purchased for the modernization of the eastern route structure will probably be among the world's more advanced models. In the West,

equipment will be less advanced, yet reliable in terms of performance.

*c. POTENTIAL FOR TECHNOLOGICAL UPGRADE:*

Taking into account China's goal to develop a nation-wide ATC system, and future plans for air traffic management controlled by satellites and ground stations, the capacity for equipment upgrade is an important consideration. As noted, future plans include a possible upgrade to "Mode S" technology and satellite communication. As test cases in satellite communications and radar, CAAC is now using six satellite ground stations to cover gaps in radar tracking along several domestic air routes.

*d. RELIABILITY:*

CAAC wants dependable, long-lasting equipment. Therefore, vendor and product history are important considerations in purchasing decisions. After-sales and maintenance assistance from the manufacturer is also essential and carefully evaluated.

An additional note on conditions that affect American companies' competitive position in China concerns the method by which companies structure their tender offers. US companies submit very detailed bids that include spare parts expenses and projected maintenance needs. The original bid considers and accounts for all technical aspects of a project. This method is sound from an engineering point of view, but with all the costs factored in, American prices turn out to be quite high. Other foreign companies, on the other hand, tend to submit vague bids that do not include all the technical and engineering details. Consideration of spare parts is often left for future sales. This enables these companies to offer low initial prices, even though the long-term cost to the end user is often higher than the original American price.

According to officials, CAAC applies three essential principles in all procurement deliberations:

1. Technology: Technology must be the best and most reliable for the price offered.
2. Price: Prices must be reasonable given the technology and capability of the equipment.
3. Service: After sales service and maintenance assistance from the manufacturer is essential and is evaluated carefully.

## **G. MARKET POSITION**

*1. IMPORT CLIMATE:*

Because ATC equipment is considered basic infrastructure, and thus receives significant attention from the government, the import climate is very favorable. The procurement process, however,

can be confusing as, for example, the number of funding sources grows. However, meeting Chinese technical standards is not usually problematic because the technical level of imported equipment is higher than that of local equipment. Tariffs are 30% on overseas equipment and there is a 10% value added tax.

## 2. FINANCING:

As noted, a large portion of Chinese airport projects are financed by the Japanese OECF. The OECF disburses large funds through concessionary yen loans for large-scale capital projects. ATC procurement loans for 52 airports were granted by the OECF in 1992 and 1993. These loans are all "general untied loans", which means that they are not tied to purchases from Japan, any company can tender a bid, which is evaluated on the basis of the principles of international competitive bidding.

Besides state-sponsored investment, foreign private investment has become increasingly important as another financing resource. CAAC recently announced that it has plans to possibly open up state owned carriers and airports to foreign investment. China's six largest regional airlines would be converted to shareholding enterprises. While investment is welcomed it generally must be approved and monitored by CAAC.

### Key Contacts

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## H. TRADE PROMOTION OPPORTUNITIES

An aviation industry trade promotion opportunity, Aviation Expo/China '95, is scheduled for October 1995 (exact date pending) at the China International Exhibition Center in Beijing. This is a biennial event, and Aviation Expo/China '95 will be the sixth of its kind.

Product categories to be promoted at the expo include air traffic control and navigation equipment; aircraft and aircraft engines; air defence, missiles and air force technologies; apron equipment and vehicles; avionics; aircraft production equipment and components; space, satellite and communication technologies; aircraft cargo and airfreight, maintenance and overhaul facilities, consulting, management and financial services.

The organizers of Aviation Expo/China '95 are China Aviation Suppliers Corp. (CASC), China National Aero Technology I/E Corp (CATIC), China Precision Machinery I/E Corp (CPMIEC), China Great Wall Industry Corp (CGWIC), China International Exhibition Center and China Promotion Ltd (Hong Kong). It is sponsored by the Aerospace Sub-Council of the China Council for the Promotion of International Trade, China National Electronics Import and Export Corp (CEIEC) and several departments of the People's Liberation Army. The military sponsors

include the General Staff of the PLA -Equipment Department, the Air Force - Scientific Research Department and the Navy - Equipment and Technology Department

Aviation Expo/China '95 is a certified event of the USDOC, previous shows have had up to 35 American companies showing their products and services. Those parties interested in China's aviation industry are encouraged to attend. The address of the China International Exhibition Center is No. 6, East Beisanhuan Road, Beijing. The contact person at the center is Ms Chen Ruowei, General Manager, in the Show Management Department, CIEC.

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